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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/806,727	03/22/2004	Yiping Hu	H0006977--1060	2613
128	7590	06/23/2004	EXAMINER	
HONEYWELL INTERNATIONAL INC. 101 COLUMBIA ROAD P O BOX 2245 MORRISTOWN, NJ 07962-2245			MICHENER, JENNIFER KOLB	
			ART UNIT	PAPER NUMBER
			1762	

DATE MAILED: 06/23/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/806,727	Applicant(s) HU ET AL.	
	Examiner Jennifer K. Michener	Art Unit 1762	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 March 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-23 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>3/22/04</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 10, 20, and 23 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. It is not clear how Applicant can provide hot isostatic pressing at up to 23,000 degrees F.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-3 are rejected under 35 U.S.C. 102(b) as being anticipated by James et al. (6,491,208).

James teaches a method of repairing a turbine component by cold spraying powder material to build up degraded areas on the turbine component (abstract). James teaches that multiple cold spray passes may be used (col. 5, line 35), therefore, any spraying after the first pass would act as a post-spray process for consolidating the applied material of the first pass due to the force of impact of later-applied layers.

James specifically teaches exemplary repair of a turbine blade tip, as required by claims 2-3.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 4-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over James.

James teaches that which is disclosed above regarding repair of a turbine blade. Specifically James teaches that part of the repair process is disassembling the turbine to provide access to a part having an area to be repaired (col. 2, line 58). One example he provides is repair of a tip, however he fails to specifically teach repair of a leading edge, platform, or z-notch shroud part of a turbine blade.

However, the turbine blade of James will have a leading edge, platform, and z-notch shroud. Since the repair of the tip of said blade is merely exemplary and since James teaches disassembly to provide access to an area to be repaired, it would have been obvious to one of ordinary skill in the art to repair any area of the blade in need of repair by the method of James.

7. Claims 1-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over James in view of Arnold (6,049,978).

James teaches that which is disclosed above regarding repair-coating a damaged turbine blade by cold-spraying. Cold-spraying is taught to be a process of spraying coating particles at supersonic speed such that their kinetic energy is converted to plastic deformation of the particles upon impact. This process forms a dense coating

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which is mechanically adhered to the substrate (col. 4). What James fails to teach is the post-treatment steps of Applicant.

Arnold teaches a method of repairing turbine blade parts by coating with a high-density coating process involving supersonic spraying of coating particles that form a dense coating which is mechanically adhered to the substrate (abstract; col. 3), similar to the method of James. While the coating of Arnold is dense, like James, in fact having a porosity of only about 0.5% (col. 9, line 38), Arnold teaches that the mechanical adhesion of the coating is not sufficient without post-treatment steps which further densify the coating and convert the mechanical adhesion of the repair coating to a metallurgical/diffusion bond (col.s 3-4; col. 9, line 47).

Since James and Arnold both teach supersonic spraying of coating particles to form a dense, mechanically adhered repair coating on turbine blades and Arnold teaches the use of post-treatment steps to further densify the coating and enhance its adhesion to the substrate, Arnold would have reasonably suggested his post-treatment steps in the method of James. It would have been obvious to one of ordinary skill in the art to use the teachings of Arnold in the method of James to provide James with a denser, well-bonded coating (col. 9, line 36).

Claims 2-6 are rejected for the same reasons as applied in the James rejection, above.

Regarding claims 7-10, Applicant requires various species of post-treatment, disclosed separately. Arnold teaches, as post-treatment, the use of a sintering heat treatment and

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hot isostatic pressing (see Figure 1(a)). Sintering is inclusive of vacuum sintering, particularly in light of the use of sintering to remove porosity which would be aided by the use of a vacuum.

Arnold teaches sintering heat treatment at 2150 degrees F, for about 2 hours (col. 7, line 63), lying the within ranges claimed by Applicant in claim 8.

Arnold teaches hot isostatic pressing (HIP) at about 2200 F in about 15 KSI argon for about 4 hours, lying within the ranges claimed by Applicant in claim 10.

Arnold teaches cooling after isostatic pressing (col. 20, line 57), as required by claim 11, however, Arnold fails to teach the cooling rate. It is Examiner's position that selection of a cooling rate would have been obvious to an ordinary artisan. Selection of a cooling rate would have been within the ordinary skill of an artisan depending on the metallurgical properties of the substrate and coating materials and the desired time-frame for completion of the coating operation.

It is well settled that determination of optimum values of cause effective variables such as these process parameters is within the skill of one practicing in the art. *In re Boesch*, 205 USPQ 215 (CCPA 1980).

Regarding claim 12, Arnold teaches sintering heat treatment and hot isostatic pressing, as outlined above, both of which qualify as heat-treatment. While the sintering heat treatment meets the limitations of the first heat treatment step of claim 12, Arnold fails to teach the temperature and time ranges of the second claimed heat treatment step.

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However, as outlined above, one of ordinary skill in the art would have been capable of optimizing a cause-effective variable such as time or temperature depending on the properties of the substrate and coating and the desired timeframe for completion of the coating operation.

This reading of the reference also meets the limitations of claim 13, requiring all three species outlined above, used together, because the heat sintering step and the HIP step would both meet the limitation of the heat treatment step, i.e., by sintering or HIP'ing, a heat treatment step is also performed.

Dependent claims 14-22 have been addressed regarding the claims dependent on claim 1.

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Similar to James, Subramanian (6,444,259), Seth et al. (6,706,319), and Wagner et al. (6,365,222) teach cold-spraying turbine blades for repair.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer K. Michener whose telephone number is (571) 272-1424. The examiner can normally be reached on Monday through Thursday and alternate Fridays.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive P. Beck can be reached on 571-272-1415. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



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June 21, 2004